

TABLE OF CONTENTS

Table of Contents.....	1
Chapter Forty-one	2
41-1.0 GENERAL.....	2
41-2.0 PRINCIPLES OF CAPACITY (HCM Chapters 1 and 2).....	2
41-3.0 FREEWAYS (HCM Chapters 3, 4, 5 and 6).....	3
41-4.0 RURAL HIGHWAYS (HCM Chapters 7 and 8)	3
41-5.0 URBAN STREETS (HCM Chapters 9, 10, 11, 12, 13 and 14).....	3

CHAPTER FORTY-ONE

HIGHWAY CAPACITY

Special Report 209 *Highway Capacity Manual* (HCM), latest edition, has been adopted by the Department as the basic document for traffic capacity analyses. Chapter Forty-one presents a brief Indiana Supplement to the HCM. The Supplement:

1. presents additional information on capacity analysis procedures not in the HCM;
2. elaborates on specific sections of the HCM;
3. presents clarifying information;
4. modifies sections from the HCM where Indiana has adopted a different practice; and
5. where the HCM presents more than one option, indicates the Department's adopted practice.

Unless stated otherwise in Chapter Forty-one, the Department has fully adopted the HCM. Chapter Forty-one has been organized to follow the sequence presented in the HCM.

41-1.0 GENERAL

The latest edition of the HCM is the primary reference INDOT uses to perform the Department's traffic capacity analyses. Another major source of information on capacity analyses for highways and streets is the current edition of AASHTO *A Policy on Geometric Design of Highways and Streets* (Green Book). Other sources on capacity analyses may be appropriate; however, prior to their use, the designer should first consult with the Environment, Planning and Engineering Division's Environmental Services Section and with the Design Division's Specialty Project Group to confirm that these methodologies are applicable or acceptable to the Department.

Most of the methodologies presented in the HCM are provided on a computerized software package entitled *Highway Capacity Software* (HCS). The HCS package and the User's Manual can be purchased from McTrans Center, 512 Weil Hall, Gainesville, Florida 32611-2083. The user should contact the Environmental Services Section to determine which version(s) may be used for capacity analyses on INDOT projects. Other software packages which are based on the HCM may also be used; however, only after prior approval by INDOT. This approval will ensure that the software is an acceptable alternative to the HCS.

41-2.0 PRINCIPLES OF CAPACITY (HCM CHAPTERS 1 AND 2)

The following comment refers to HCM Chapter 2 “Traffic Characteristics.”

Peak-Hour Factor. Desirably, existing traffic data should be used to determine the appropriate peak-hour factor. If the peak-hour factor cannot be determined from the existing traffic data, then a peak-hour factor of 0.90 may be used. Factors as low as 0.60 may be used at locations where significant peaking is expected to occur such as at factories, industrial parks, schools, etc.

41-3.0 FREEWAYS (HCM CHAPTERS 3, 4, 5 AND 6)

The following comments refer to HCM Chapter 3 “Basic Freeway Segments.”

1. Truck Lane Usage. On Indiana freeways, trucks are required to use the right lane on 4-lane freeways and the right two lanes for 6-lane or more freeways. Unless specific counts or observations are available, the truck distribution for 6-lane facilities can be assumed to be split evenly between the middle and right lanes. These configurations need to be considered during the freeway capacity analysis calculations.
2. Heavy Vehicle Factor. Table 3-9 “Adjustment Factor for the Effect of Trucks, Buses, or Recreational Vehicles in the Traffic Stream” should only be used if the traffic stream consists only of trucks, buses or recreational vehicles and not a combination of these vehicles. If the traffic stream consists of a combination of these vehicles, then Equation 3-4 and the accompanying tables should be used instead.

41-4.0 RURAL HIGHWAYS (HCM CHAPTERS 7 AND 8)

The following comment refers to HCM Chapter 8 “Two-Lane Highways.”

Climbing Lanes. Chapter Forty-four discusses the warrants for climbing lanes on State highways. The designer should note that the warrants presented in Chapter Forty-four are different than those presented in the HCM and the AASHTO *A Policy on Geometric Design of Highways and Streets*.

41-5.0 URBAN STREETS (HCM CHAPTERS 9, 10, 11, 12, 13 AND 14)

The following comments refer to HCM Part IV “Urban Streets.”

1. Urban LOS. For many urban highway elements, especially at signalized intersections, a LOS C may be difficult to attain. Often, a LOS D is more attainable for a 10- to 20-year design. Chapters Fifty-three and Fifty-five provide the design LOS values for Department projects.

2. 3-Lane Section. The HCM does not directly address capacity of continuous, alternating or 2-way median left-turn lanes. Many times, a 3-lane section with heavy left-turn movements will have more capacity and greater safety than a 4-lane section without separate turn lanes. National studies are presently being conducted which may provide capacity information on these configurations in the near future.

The following discusses several issues relative to HCM Chapter 9 “Signalized Intersections.”

1. Planning Methodology. Due to possible misapplications, the “Planning Analysis” should not be used for capacity analyses at signalized intersections. Instead, the “Operational Analysis” procedure should be used for these analyses.
2. Operational Analysis. After using the HCM procedure, the user should check this information using one of the signal timing programs that are available (e.g., Passer II, SOAP84). See Chapter Seventy-seven for additional information.
3. Level of Service (LOS). As a guide, no “lane group LOS” or “approach LOS” should fall more than 1 LOS below the intersection LOS (or design LOS). However, this may not always be practical, especially for left-turn lanes and some side street groups. Chapters Fifty-three and Fifty-five provide the LOS values used in design.
4. Cycle Length. In general, the cycle lengths should be at least 60 seconds, but should not exceed 120 seconds. Care should be exercised not to allow the degree of saturation to approach 1.0, especially for short cycle lengths.